2. The method of claim 1, wherein the dividing divides the collected radiation into an ordinary ray and an extraordinary ray, said two rays having substantially orthogonal polarizations.

3. The method of claim 1, wherein the directing includes passing the collected radiation through an optical element having a plane of polarization at an angle different from 0, 90, 180 and 270 degrees to the plane of incidence.

4. (Amended) The method of claim 1, wherein the dividing includes passing the collected radiation through an optical element having a plane of polarization at an angle of about 0, 45, 90, 135, 180, 225, 270 or 315 degree to the plane of incidence.

5. (Amended) The method of claim 1, wherein the directing directs an unpolarized beam to the structure, and wherein the dividing includes passing the collected radiation through an optical element having a plane of polarization at an angle of about 0, 90, 180 or 270 degree to the plane of incidence.

6. An apparatus for measuring one or more parameters of a periodic structure, comprising:

an instrument directing a polychromatic beam of electromagnetic radiation to the structure;

optics collecting radiation from the beam after it has been modified by the structure;

a device dividing the collected radiation into two collected rays having different polarization states;

detectors detecting the two rays to provide two outputs; and

a processor deriving the one or more parameters from the two outputs.

7. The apparatus of claim 6, wherein the device divides the collected radiation into an ordinary ray and an extraordinary ray, said two rays having substantially orthogonal polarizations.

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8. The apparatus of claim 6, wherein the instrument includes an optical element having a plane of polarization at a non-zero angle to the plane of incidence, wherein said plane of polarization is not perpendicular to the plane of incidence.

9. (Amended) The apparatus of claim 6, wherein the device includes an optical element having a plane of polarization at an angle to the plane of incidence, where the angle is about 0, 45, 90, 135, 180, 225, 270 or 315 degree.

10. (Amended) The apparatus of claim 6, wherein the instrument directs an unpolarized beam to the structure, and wherein the device includes an optical element passing the collected radiation, said optical element having a plane of polarization at an angle of about 0, 90, 180 or 270 degree to the plane of incidence.

11. (Amended) The apparatus of claim 6, wherein the instrument focuses the beam to the structure and each of said instrument and said optics has a numerical aperture, and wherein the numerical aperture of the optics is smaller than that of the instrument.

12. A method for measuring one or more parameters of a periodic structure, comprising:

(a) directing a polychromatic beam of electromagnetic radiation to the structure in a plane of incidence;

(b) collecting radiation from the beam after it has been modified by the structure;

(c) passing the collected radiation through a first polarizing element having a polarization plane at a first angle to the plane of incidence;

(d) detecting the collected radiation passing through the element to provide an output;

(e) altering the first angle between the two planes to a different value and repeating (a), (b), (c) and (d), wherein said different value remains substantially stationary when (a), (b), (c) and (d) are repeated to provide at least an additional output; and

(f) deriving the one or more parameters from the outputs.

13. The method of claim 12, wherein said different stationary value of the angle is one of 0, 45, 90, 135, 180, 225, 270 and 315 degrees.

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14. The method of claim 12, wherein said directing includes passing radiation through a second polarizing element having a polarization plane at a second angle to the plane of incidence, said second angle having a value different from 0, 90, 180 and 270 degrees.

15. The method of claim 14, wherein said polarization planes of the two elements are substantially parallel or perpendicular to each other.

16. An apparatus for measuring one or more parameters of a periodic structure, comprising:

a source directing a polychromatic beam of electromagnetic radiation to the structure in a plane of incidence;

optics collecting radiation from the beam after it has been modified by the structure;

a first polarizing element having a polarization plane at a first angle to the plane of incidence passing the collected radiation;

a detector detecting the collected radiation that has passed through the element to provide an output;

an instrument rotating the first element relative to the plane of incidence to alter the value(s) of the first angle to one or more different value(s) that remain substantially stationary when said detector is detecting the collected radiation, so that the detector provides at least one output before and after the first angle is altered; and

a processor deriving the one or more parameters from the outputs.

17. The apparatus of claim 16, wherein said different value of the first angle is one of 0, 45, 90, 135, 180, 225, 270 and 315 degrees.

18. The apparatus of claim 16, said source including a second polarizing element passing radiation to provide said beam, said second element having a polarization plane at a second angle to the plane of incidence, said instrument rotating one or more of the two elements relative to the plane of incidence to alter the value(s) of the first and/or the second angle to one or more different value(s) that remain substantially stationary when said detector is detecting the collected radiation.

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19. The apparatus of claim 18, wherein said different value(s) of the first and/or second angle are one of 0, 45, 90, 135, 180, 225, 270 and 315 degrees.

20. (Amended) The apparatus of claim 16, wherein the source focuses the beam to the structure and each of said source and said optics has a numerical aperture, and wherein the numerical aperture of the optics is smaller than that of the source.

21. The apparatus of claim 16, wherein said source includes a second polarizing element having a polarization plane at an angle to the plane of incidence, said second element passing radiation to provide said beam, said angle having a value different from 0, 90, 180 and 270 degrees.

22. The apparatus of claim 21, wherein said polarization planes of the two elements are substantially parallel or perpendicular to each other.

23. An apparatus for measuring one or more parameters of a periodic structure, comprising:

an optical device including a first element directing a polychromatic beam of electromagnetic radiation to the structure in a plane of incidence and a second optical element passing radiation from the beam after it has been modified by the structure, said two elements attached together to form an integrated unit or being an integral unit;

said second element having a plane of polarization; and

at least one detector detecting the collected radiation that has passed through the second element to provide at least one output.

24. The apparatus of claim 23, said plane of polarization is at an angle to the plane of incidence, said angle having a value different from 0, 90, 180, 270 degrees.

25. (Amended) The apparatus of claim 24, wherein said plane of polarization is at an angle of about 0, 45, 90, 135, 180, 225, 270 or 315 degree to the plane of incidence.

26. The apparatus of claim 23, wherein the second element divides the radiation from the beam after it has been modified by the structure into an ordinary ray and an

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extraordinary ray, said two rays having substantially orthogonal polarizations, said apparatus further comprising two detectors, each of the two detectors detecting a corresponding one of the two rays.

27. The apparatus of claim 23, wherein each of said two elements has a numerical aperture, and wherein the numerical aperture of the second element is smaller than that of the first.

28. The apparatus of claim 23, further comprising a processor deriving the one or more parameters from the output.

29. (Amended) An apparatus for inspecting a sample having a periodic structure thereon, comprising:

(a) a detection system including:

a device directing a polychromatic beam of electromagnetic radiation to the structure;

optics collecting radiation from the beam after it has been modified by the structure; and

at least one detector detecting the collected radiation to provide at least one output;

(b) a first instrument causing translational motion of the sample in a first direction; [and]

(c) a second instrument causing translational motion between the first instrument and the system in a second direction transverse to the first direction; and

(d) a processor deriving one or more parameters of the periodic structure from the at least one output.

30. (Amended) The apparatus of claim 29, said system further including a polychromatic radiation source, and the second instrument causes translational motion of the source.

31. The apparatus of claim 29, said system further including a conduit carrying a collimated beam of radiation.

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32. The apparatus of claim 29, further including an optical arrangement directing an incoming radiation beam to the detection system along different optical paths when relative motion is caused between the system and the sample, so that the different optical paths have substantially the same optical path length.

33. The apparatus of claim 29, said arrangement including a radiation reflective element that moves together with the second instrument reflecting radiation towards the device along optical paths that are substantially at 45 degrees to a trajectory of the device when moved by the two instruments.

34. (Amended) An apparatus for inspecting a sample having a structure thereon, comprising:

(a) a detection system including:

a device directing a polychromatic beam of electromagnetic radiation to the structure;

optics collecting radiation from the beam after it has been modified by the structure; and

at least one detector detecting the collected radiation to provide at least one output, said detector comprising a spectrometer detecting the collected radiation at a plurality of distinct wavelengths simultaneously;

(b) an instrument causing first motion of the sample, and second motion between the first instrument and the system, wherein one of the two motions is translational and the remaining motion is translational or rotational.

35. (Amended) The apparatus of claim 34, said system further including a polychromatic radiation source.

36. The apparatus of claim 34, said system further including a conduit carrying a collimated beam of radiation.

37. The apparatus of claim 34, further including an optical arrangement directing an incoming radiation beam to the detection system along different optical paths when relative

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motion is caused between the system and the sample, so that the different optical paths have substantially the same optical path length.

38. The apparatus of claim 34, said arrangement including a radiation reflective element that moves together with the second instrument reflecting radiation towards the device along optical paths that are substantially at 45 degrees to a trajectory of the device when moved by the two instruments.

39. An integrated processing and detection apparatus for processing a sample having structures thereon, comprising:

(a) a detection system for finding one or more parameters of a structure, wherein the system detects the structure by directing a polychromatic beam of electromagnetic radiation to the structure, collecting radiation from the beam after it has been modified by the structure; said system including:

a device dividing the collected radiation into two collected rays having different polarization states;

detectors detecting the two rays to provide two outputs; and

a processor deriving the one or more parameters from the two outputs; and

(b) a processing system processing the sample, said processing system responsive to said one or more parameters for adjusting a processing parameter.

40. The apparatus of claim 39, said detection system further including a radiation source that provides the polychromatic beam.

41. The apparatus of claim 39, further including a conduit for transmitting radiation to said detection system.

42. The apparatus of claim 41, said conduit including an optical fiber.

43. The apparatus of claim 39, further including an instrument causing relative motion between the detection system and the sample in order to detect an area of the sample, an optical arrangement directing an incoming radiation beam to the detection system along

different optical paths when relative motion is caused between the system and the sample, so that the different optical paths have substantially the same optical path length.

44. (Amended) The apparatus of claim 39, said detection system including one or more reflective optical elements that focus(es) radiation to the structure or collect(s) radiation from the structure.

45. An integrated processing and detection apparatus for processing a sample having structures thereon, comprising:

(a) a detection system for finding one or more parameters of a structure, wherein the system detects the structure by directing a polychromatic beam of electromagnetic radiation to the structure in a plane of incidence, collecting radiation from the beam after it has been modified by the structure; said detection system including:

a first polarizing element having a polarization plane at a first angle to the plane of incidence passing the collected radiation;

a detector detecting the collected radiation that has passed through the element to provide an output;

an instrument rotating the first element relative to the plane of incidence to alter the value(s) of the first angle to one or more different value(s) that remain substantially stationary when said detector is detecting the collected radiation, so that the detector provides at least one output before and after the first angle is altered; and

a processor deriving the one or more parameters from the outputs;

(b) a processing system processing the sample, said processing system responsive to said one or more parameters for adjusting a processing parameter.

46. The apparatus of claim 45, said detection system further including a radiation source that provides the polychromatic beam.

47. The apparatus of claim 45, further including a conduit for transmitting radiation to said detection system.

48. The apparatus of claim 47, said conduit including an optical fiber.

49. The apparatus of claim 45, said system further including a second instrument causing relative motion between the detection system and the sample in order to detect an area of the sample, said system further including an optical arrangement directing an incoming radiation beam to the detection system along different optical paths when relative motion is caused between the system and the sample, so that the different optical paths have substantially the same optical path length.

50. (Amended) The apparatus of claim 45, said detection system including one or more reflective optical elements that focus(es) radiation to the structure or collect(s) radiation from the structur.

51. (Amended) An integrated processing and detection apparatus for processing a sample having a structure thereon, comprising:

(a) a detection system including:

a device directing a polychromatic beam of electromagnetic radiation to the structure;

optics collecting radiation from the beam after it has been modified by the structure; and

at least one detector detecting the collected radiation to provide at least one output;

(b) a first instrument causing motion of the sample;

(c) a second instrument causing relative motion between the first instrument and the system so that the beam has access to any location of the sample; and

(d) a processing system processing the sample, said processing system responsive to said at least one output for adjusting a processing parameter.

52. The apparatus of claim 51, said detection system further including a radiation source that provides the polychromatic beam.

53. The apparatus of claim 51, further including a conduit carrying a collimated beam of radiation to the detection system.

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54. The apparatus of claim 51, further including an optical arrangement directing an incoming radiation beam to the detection system along different optical paths when relative motion is caused between the system and the sample, so that the different optical paths have substantially the same optical path length.

55. The apparatus of claim 51, said two instruments causing translational motion that are substantially perpendicular to each other, said arrangement including a radiation reflective element that moves together with the second instrument reflecting radiation towards the device along optical paths that are substantially at 45 degrees to a trajectory of the device when moved by the two instruments.

56. (New) The method of claim 1, wherein the detecting detects at least one of the two rays by means of a spectrometer to provide outputs at a plurality of wavelengths.

57. (New) The method of claim 1, wherein the directing comprises focusing radiation to the structure.

58. (New) The method of claim 1, wherein the detecting detects reflectance of the structure at a plurality of wavelengths.

59. (New) The method of claim 1, wherein the deriving derives a critical dimension, height or sidewall angle of the structure.

60. (New) The apparatus of claim 6, wherein at least one of the detectors comprises a spectrometer to provide outputs at a plurality of wavelengths.

61. (New) The apparatus of claim 6, wherein the instrument comprises an objective focusing radiation to the structure.

62. (New) The apparatus of claim 6, wherein at least one of the detectors detects reflectance of the structure at a plurality of wavelengths.

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63. (New) The apparatus of claim 6, wherein the processor derives a critical dimension, height or sidewall angle of the structure.

64. (New) The apparatus of claim 29, wherein the processor derives a critical dimension, height or sidewall angle of the structure.

65. (New) The apparatus of claim 34, wherein the processor derives a critical dimension, height or sidewall angle of the structure.

66. (New) The apparatus of claim 39, wherein the processor derives a critical dimension, height or sidewall angle of the structure.

67. (New) The apparatus of claim 45, wherein the processor derives a critical dimension, height or sidewall angle of the structure.

68. (New) The apparatus of claim 51, wherein the processor derives a critical dimension, height or sidewall angle of a periodic structure of the sample.

69. (New) The method of claim 12, wherein the detecting detects at least one of the two rays by means of a spectrometer to provide outputs at a plurality of wavelengths.

70. (New) The method of claim 12, wherein the directing comprises focusing radiation to the structure.

71. (New) The method of claim 12, wherein the detecting detects reflectance of the structure at a plurality of wavelengths.

72. (New) The method of claim 12, wherein the deriving derives a critical dimension, height or sidewall angle of the structure.

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73. (New) The apparatus of claim 16, wherein the detector comprises a spectrometer to provide outputs at a plurality of wavelengths.

74. (New) The apparatus of claim 16, wherein the source comprises an objective focusing radiation to the structure.

75. (New) The apparatus of claim 16, wherein the detector detects reflectance of the structure at a plurality of wavelengths.

76. (New) The apparatus of claim 16, wherein the processor derives a critical dimension, height or sidewall angle of the structure.

77. (New) The apparatus of claim 23, wherein the at least one detector comprises a spectrometer to provide outputs at a plurality of wavelengths.

78. (New) The apparatus of claim 23, wherein the first element comprises an objective focusing radiation to the structure.

79. (New) The apparatus of claim 23, wherein the at least one detector detects reflectance of the structure at a plurality of wavelengths.

80. (New) The apparatus of claim 23, further comprising a processor deriving a critical dimension, height or sidewall angle of the structure.